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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/613,960

07/03/2003

Olga Bakajin

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6753

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09/20/2006

EXAMINER

MENON, KRISHNAN S

James S. Tak

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ART UNIT

PAPER NUMBER

1723

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.Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/613,960

Applicant(s)

BAKAJIN ET AL.

Examiner

Krishnan S. Menon

Art Unit

1723

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 September 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-15 and 17-46 is/are pending in the application.
- 4a) Of the above claim(s) 20-44 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-15,17-19,45 and 46 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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DETAILED ACTION

Claims 1,3-15 and 17-46 are pending, of which claims 20-44 are withdrawn from consideration, as amended 9/8/06.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1,3-15,17-19,45 and 46 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The limitations, "elastically compressed"; and "elastically compress" have no supporting disclosure in the specification or claims as originally filed. Figures 1C and 1D may provide disclosure for "compressed", but not "elastically compressed".

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1,3-15,17-19, 45 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dai et al (US 2004/0149209) in view of Noca' 810.

Claims 1 and 45: Dai teaches a carbon nanotube mesh comprising a plurality of intertwined free-standing carbon nanotubes (paragraph 4, examples 1 and 2), densely packed (paragraph 68), fixedly attached to a substrate which is useful for separating, concentrating or filtering molecules (paragraphs 44, 2). Dai also teaches the process as claimed in claim 45. However, Dai does not teach the specifics of the structure of the microfluidic channel for the device, such the channel and the cover. However, such channel and cover structures is implied by the reference in its teaching of the intended use as filters. "[I]n considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom." In re Preda, 401 F.2d 825, 826, 159 USPQ 342, 344 (CCPA 1968); In re Lamberti, 545 F.2d 747, 750, 192 USPQ 278, 280 (CCPA 1976). One of ordinary skill in the art would recognize that the random-grown carbon nanotube mesh of Dai would have to be made into a usable form, before it can be used as a filter or membrane.

Noca teaches the specific structure of the microfluidic channel with cover for use in separation processes (figures 5 and 6, abstract, col 4 line 15 – col 5 line 37). It would be obvious to one of ordinary skill in the art at the time of invention to use the teaching of Noca in the teaching of Dai for the structural details that are missing from the Dai reference for making the device for its intended use. With respect to the 'elastically compressed', the carbon nanotubes in the channel with cover, as taught by the

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references, can have some degree of inherent compression because they are random grown and densely packed, and the carbon nanotubes can be inherently elastic, like that of the applicant.

Re Claims 3-19, Noca teaches all the structural details as follows:

Claim 3: channel filled with the mesh – see figure 5 at 54.

Claim 4: nanotube mesh without filling the channel – see col 6 lines 45-54 wherein it teaches any size, shape and spacing; which would include partial filling of channel segments. Figures show part of the channels unfilled.

Claims 5 -7: more than one mesh – see figure 6. complete or partial fill of the nanotubes, or gap therethrough – see col 6 lines 45-54.

Claim 8 recites intended use. See abstract.

Claims 9-11 – functionalized/derivatized – see col 8 lines 33-47.

Claim 12: pore size, etc – col 5 lines 20-27.

Claims 13 - 15: etched as a groove, cover layer, anodically bonded (conventional MEMS process) – fig 5 and 6, col 10 lines 47-67.

Claim 17: more than one channel – fig 6

Claims 18 and 19: The references do not teach the nubbins as claimed.

However, since Dai in view of Noca teach the carbon nanotube mesh (54) as integral with or embedded in the channels (68) (Noca: col 10 lines 47-67), such nubbins become redundant and unnecessary. Ex Parte Wu.

Claim 46: Pressure driven flow is inherent in the device of Dai in view of Noca, even if the references do not specifically teach so. Under the principles of inherency, if

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a prior art device, in its normal and usual operation, would necessarily perform the method claimed, then the method claimed will be considered to be anticipated by the prior art device. When the prior art device is the same as a device described in the specification for carrying out the claimed method, it can be assumed the device will inherently perform the claimed process. In re King, 801 F.2d 1324, 231 USPQ 136 (Fed. Cir. 1986).

Response to Arguments

Applicant's arguments filed 9/8/06 have been fully considered but they are not persuasive.

With respect to claim 7, the indication of allowable subject matter in the prior office action was with the addition of the specific structure, '*nanotube meshes partially filling the cross section of the channel segment to form a central gap therethrough*', in addition to overcoming the 112, second paragraph rejection and including the limitations of the base and intervening claims. Applicant's present amendment of claim 7 does not meet these requirements.

With respect to the new matter rejection, the cited paragraph 28 does not provide disclosure for "elastic compression" of the nanotubes in the structure as claimed. The cited paragraph (paragraph 0028) only states "unique mechanical strength and elasticity which makes the mesh highly robust"; in addition, this paragraph does not provide any information on the mechanical strength or the elasticity of the mesh. When the carbon

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nanotubes (fibers) are pressed down with the lid, they would be subject to bending forces, rather than compressive forces.

The “in re Wright” case law quoted by the applicant (9 USPQ2d 1649), the microcapsules being “not permanently affixed” has support as shown by the court; and the reference used has the microcapsules being bound by “non aqueous binder”, which differentiated it from the claimed subject matter. However, that is not the case in this application. While it is possible that the carbon fibers can be elastically compressed (as is everything else in the Universe), the claimed structure would lend itself more to bending rather than compression. The structure as envisaged from the references would inherently have the characteristics of the claimed structure. The amendment of the claims with the language “elastically compressed” appears to be added after the fact for the purpose of overcoming the references, but fails to overcome the rejection.

With respect to the arguments regarding the art rejection, applicant’s arguments with respect to the Noca reference is not commensurate in scope with the rejection. The office has not suggested to ‘*replace the ordered array of Noca with the random array of Dai*’, as clearly indicated in the prior office actions.

With respect to the other argument that the references do not teach elastic compression of the nanatube mesh, any elastic compression of the nanotube mesh would be inherent. Applicant needs to show with evidence that the structure taught by the references would not have this characteristic. [T]he PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product. Whether the rejection is based on

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inherency' under 35 U.S.C. 102, on prima facie obviousness' under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same...[footnote omitted]." The burden of proof is similar to that required with respect to product-by-process claims. In re Fitzgerald, 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980) (quoting In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)).

The Noca reference was used for the channel and cover because Dai does not teach the details of channel and cover for a usable structure for the nanotubes. In fact the

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Krishnan S. Menon whose telephone number is 571-272-1143. The examiner can normally be reached on 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wanda L. Walker can be reached on 571-272-1151. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Krishnan S Menon
Examiner
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